ElectroCap Mid-Program Pitch Deck

Handheld Digital Emulating Console

João Duarte   João Pequeno

Bernardo Penela   Gonçalo Antunes

Miguel Fernandes   Lucas Leiradella

TÉCNICO LISBOA

Team

João Duarte

Bernardo Penela

Miguel Fernandes

João Pequeno

Gonçalo Antunes

Lucas Leiradella

Advisors and Mentors

Scientific Advisor

Mentor

Coordinator

Problem definition

Emulating consoles on-the-go is not viable as it can drain the battery of your other devices quickly. A handheld device whose purpose is only to emulate should solve the issue while offering more functionality.

As time passes, it becomes increasingly difficult to have access to retro games. We want people to be able to have an easy way to play their favorite games on-the-go without spending a lot of money or having to look too much.

Solution beneficiaries

The ones who benefit from our product would be all people who like relatively older games.

This product could also be appealing to younger people who might be slightly interested in LEE/LEEC courses but aren't quite sure yet.

Technological solution

The solution is a handheld console which runs natively on an FPGA, wasting less battery while still allowing a portable experience and being as close to the original console as possible.

The technologies used for this project are:

- FPGAs;
- 3D Modeling and Printing;
- Potentiometer/Hall-effect sensors;
- Data transfer protocols.

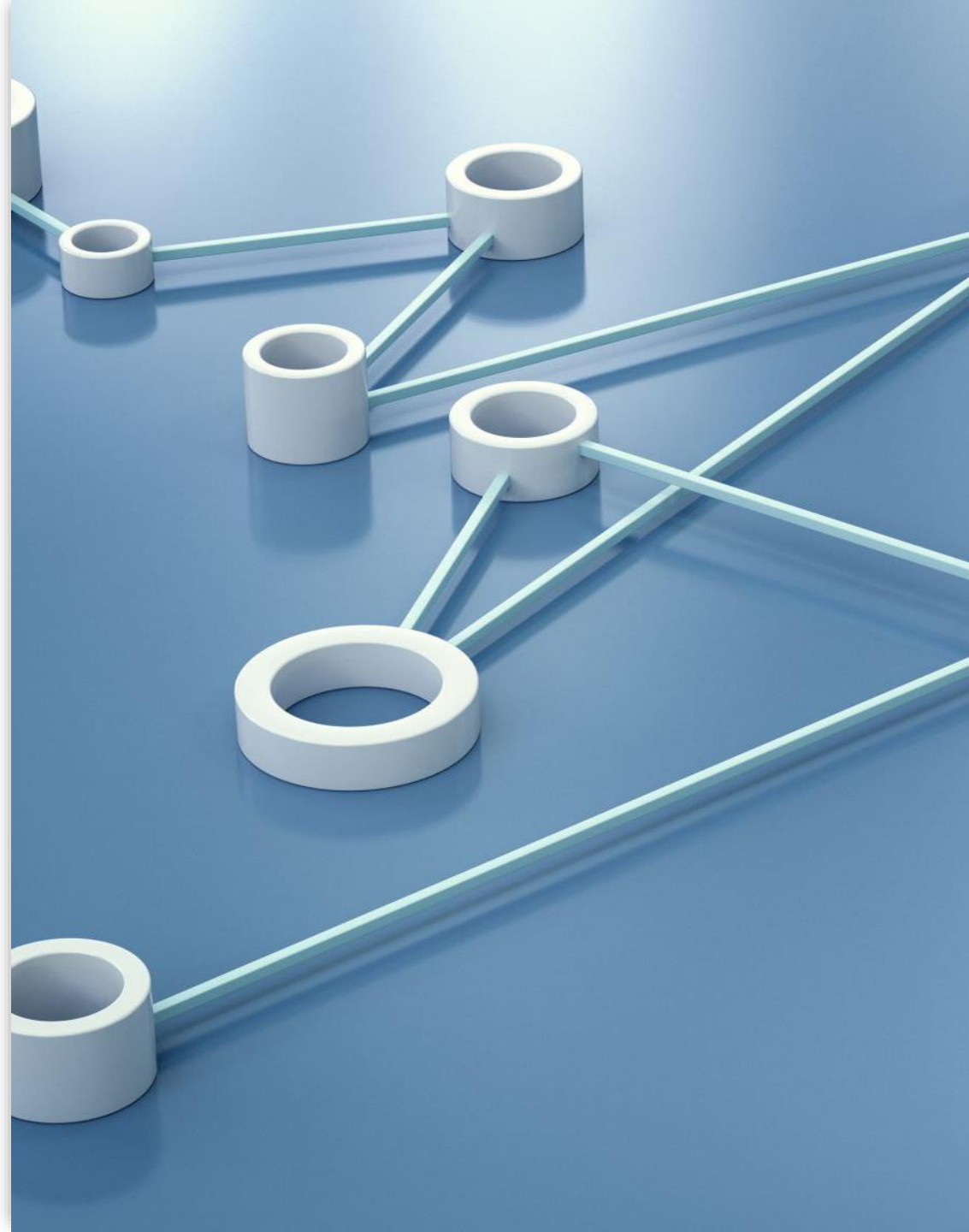# Competitors and previous work
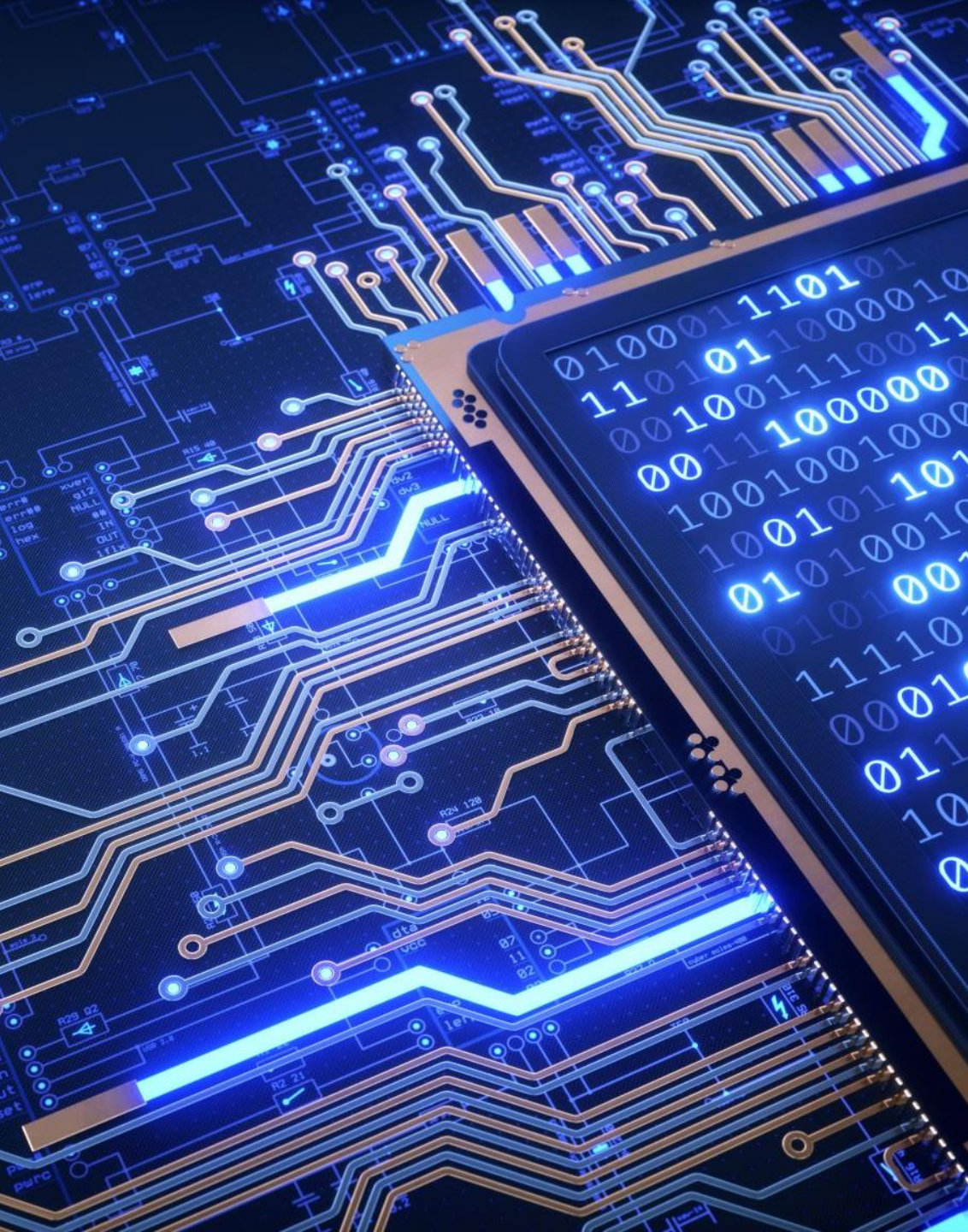
Main Competitors

Analogue Pocket

Secondary Competitors

Nintendo Switch

Steam Deck

Solution requirements

Must run at least one console and one game, have a reasonable amount of battery life (3+ hours) and, at least, semi-portable (considering an MVP). The solution must also be comfortable to be used for an average session (1h30 – 2h).

Technical challenges

The technical challenges we already encountered:

- Passing the commands to the console through the FPGA;
- Charge of the battery and the FPGA.

The technical challenges we might face are:

- Entangling every hardware component (screen, joysticks, etc. into the FPGA and then the design);
- Reading and loading each game;
- Be a totally portable design.

Testing and validation metrics

The testing and validation metrics are the following:

- Portability;
- Battery usage;
- Ease of installation;
- Ease of use;
- Ergonomics.

Division of labor (1)

| João Duarte	Bernardo Penela	Miguel Fernandes
Setup following and controller handling	Setup following and controller handling	Battery and cooling
Audio-Visual handling	Audio-Visual handling	

Division of labor (2)

João Pequeno	Gonçalo Antunes	Lucas Leiradella
3D Modeling and Design	Battery and cooling	Setup following and controller handling
Controller handling	3D Modeling and Design	Audio-visual handling
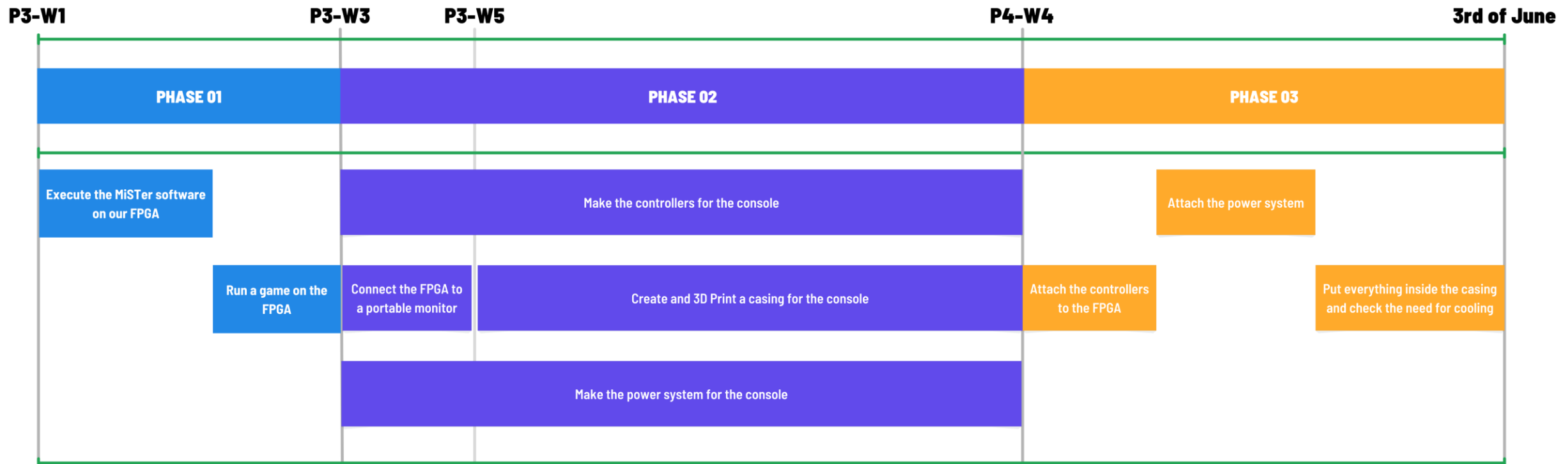
Mid-program status

The project status is:

- Trying to figure out how to put commands on the console through the FPGA;

- Designing the case for the console;

- Designing the power management system;

- Waiting for new materials to arrive.

Achieved results

The team's results until now:

- Connected the FPGA and played games with a keyboard and mouse or controller;

- Made a functioning code to run the buttons and joysticks on an Arduino;

- Made most of the sketch of a PCB where the buttons and joysticks will go (with an Arduino for now);

- Made advancements in figuring out how to put inputs on the FPGA pin in the MiSTer project;

- Every part was ordered.

Challenges faced by the team

Main challenges faced by the team:

- There were some things the team didn't consider for the prototype such as some stuff in the power management;

- Putting the controls directly in the FPGA makes us have to understand a bunch of code previously written by the community for MiSTer, as well as alter some of it;

- Getting output in VGA monitors to ease testing;

- Balancing PIC work with other classes.

Teams' priorities

The project priorities are:

- 1: Prepare the HW and respective case for demo day. Ideally it would be a transparent case made of something like transparent acrylic so the inner components would be seen;

- 2: Ensure the integrity with the battery, including the charger and circuit power;

- 3: Take out the Arduino and make the controllers run only on the FPGA.

Contribution of each team member (1)

João Duarte	Bernardo Penela	Miguel Fernandes
Controller Related	**Screen and audio**	**Part research**
Arduino handling of the controller	Choosing video and audio output	Initial setup and testing of each core
Making of a PCB for the controller	Testing used speaker	Battery and monitor research
Writing the blog on the website	Video connector designing	Creation of a form for user feedback and info
		Aiding in writing the blog

Contribution of each team member (2)

João Pequeno	Gonçalo Antunes	Lucas Leiradella
Controller Related	**Main contribution**	**Controller, Battery**
FPGA handling of the controller	Battery research	FPGA handling of the controller
Checking out FPGA code to be sure it is possible	Started 3D modulation	Testing battery circuit (schotky diode) and FPGA Voltages
		Deciding materials